

TABLE OF CONTENTS

	PAGE
EXECUTIVE SUMMARY Click Here To View	i
RECOMMENDATIONS	ii
INTRODUCTION	1
BACKGROUND	2
<i>The Department Of Public Works</i>	2
<i>Chart I - Organization Chart For The Department Of Public Works</i>	3
<i>Major Accomplishments Relating To DPW's Administration Of Contract Change Orders</i>	5
SCOPE AND METHODOLOGY	6
FINDING I	
THE DEPARTMENT OF PUBLIC WORKS CAN MORE EFFECTIVELY NEGOTIATE THE PRICE OF CONTRACT CHANGE ORDERS BY ENSURING ADHERENCE TO ITS EXISTING PROCEDURES AND IMPLEMENTING ADDITIONAL PROCEDURES	8
<i>From April 1, 1991 Through July 9, 1992 The Office Of The City Clerk Processed \$2,879,165 In DPW Contract Change Orders</i>	9
TABLE I	
<i>Change Orders Processed From April 1, 1991 Through July 9, 1992</i>	9
<i>DPW's Construction Estimating Procedures</i>	10
• Requirements	10

• Range Of Precision	11
• Preparation, Review, And Approval Of Change Order Estimates	12
<i>Noncompliance With Procedures</i>	12
<i>Additional Procedures DPW Does Not Currently Require</i>	13
<i>Direct Costs</i>	14
<i>Indirect Costs</i>	15
<i>Consequential Costs (Damages)</i>	16
<i>Benefits Of Ensuring Compliance With Existing Procedures And Adopting New Procedures</i>	17
CONCLUSION	18
RECOMMENDATIONS	18
ADMINISTRATION'S RESPONSE Click Here To View	21
APPENDIX A Click Here To View DEFINITIONS OF PRIORITY 1, 2, AND 3 AUDIT RECOMMENDATIONS	A-1
APPENDIX B Click Here To View MEMORANDUM FROM DIRECTOR OF PUBLIC WORKS TO CITY AUDITOR REGARDING CAPITAL PROJECT MANAGEMENT - CONSTRUCTION CONTRACT CHANGE ORDERS	B-1

INTRODUCTION

In accordance with the City Auditor's 1992-93 Workplan, we reviewed the Department of Public Works' (DPW) capital projects management of construction contract change orders. We conducted this audit in accordance with generally accepted government auditing standards and limited our work to those areas specified in the Scope and Methodology section of this report.

The City Auditor's Office thanks those individuals in the Department of Public Works who gave their time, information, insight, and cooperation for this audit and our two previous audits. Specifically, we would like to thank the Director of Public Works and his Administrative staff, as well as the personnel in the Design and Construction, Architectural Engineering, and Development Engineering Divisions, and the Municipal Water System Program, for their outstanding responsiveness to our many requests for information.

BACKGROUND

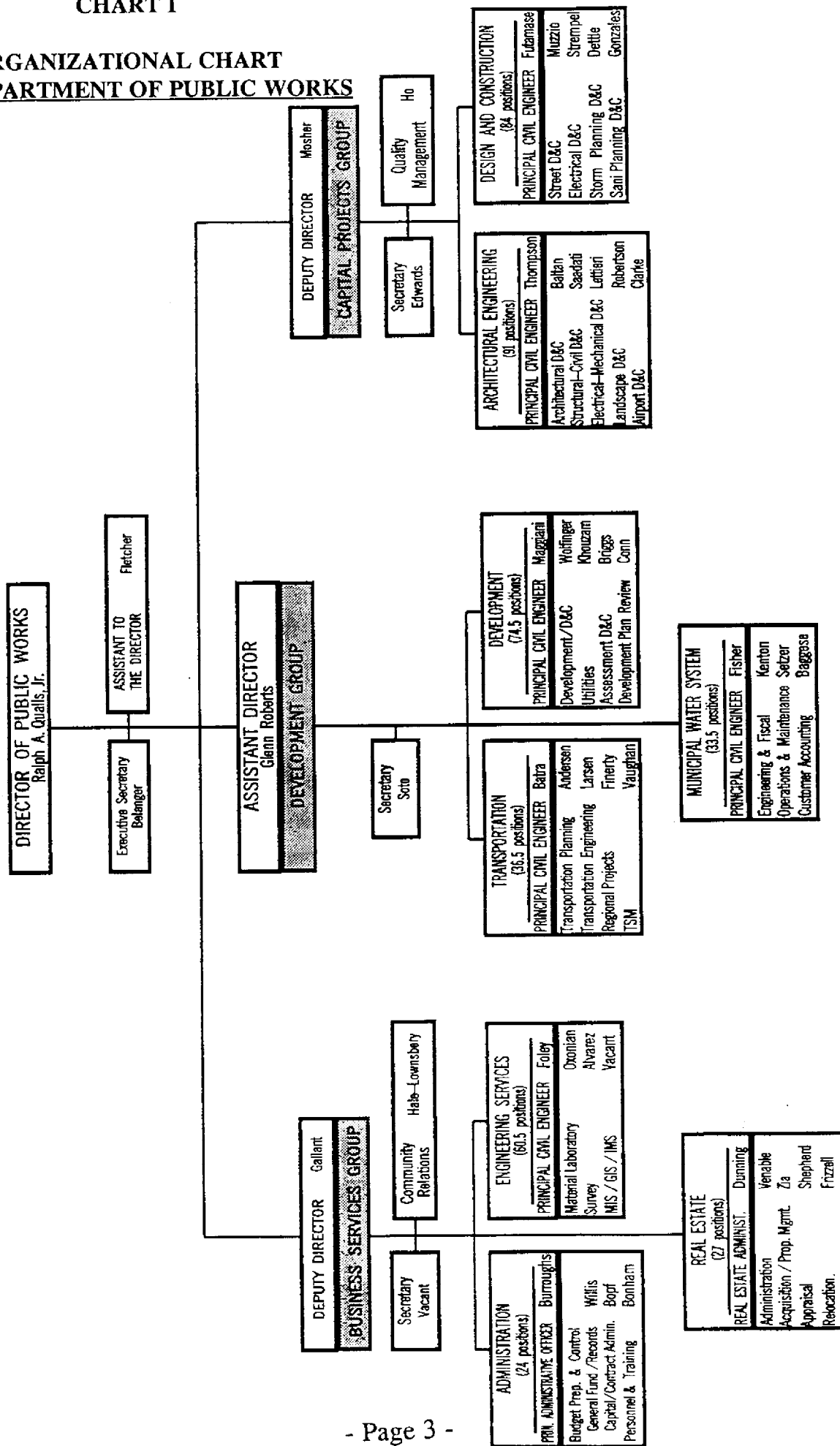
The Department Of Public Works

The mission of the Department of Public Works (DPW) is to program, plan, design, and construct a variety of public facilities; review developer-funded public improvements; and operate the San Jose Municipal Water System.

Chart I shows the organization of the DPW.

CHART I

ORGANIZATIONAL CHART FOR DEPARTMENT OF PUBLIC WORKS



Total Positions: 449.0
Revised: July 17, 1992

The DPW is the City department that is most responsible for the City's capital projects. The City's Capital Budget divides capital projects into three sections: (1) Construction Projects, (2) Non-Construction Projects, and (3) Transfers. The construction projects for which the DPW is responsible include land acquisition, master plans, design, engineering, and all inspections associated with a project. In addition to managing capital projects in its own Sanitary Sewer, Storm Drain, and Municipal Water System and Traffic Programs, the DPW manages projects for other departments such as Streets and Traffic, Recreation, Parks and Community Services, the Library, and the Airport. In the *Adopted 1991-92 Capital Budget*, total expenditures for capital construction projects were budgeted at approximately \$129.5 million. From April 1, 1991, through July 9, 1992, the Office of the City Clerk processed DPW contract change orders worth approximately \$2.9 million.

Edward R. Fisk, in his book *Construction Project Administration*, defines a change order as a

... written agreement to modify, add to, or otherwise alter the work from that originally set forth in the contract documents at the time of opening bids, provided that such alteration can be considered to be within the scope of the original project; otherwise a contract modification may be required. It is the only legal means available to change the contract provisions after the award of the contract. A change order is the formal document that alters some condition of the contract documents. The change order may alter the contract price, schedule of payments, completion date, or the plans and specifications.

The DPW issues change orders for the following reasons:

- unforeseen or changed conditions;
- design errors and omissions; and

- City-authorized change orders limited to the following:
 - changes consistent with the initial design concept to ensure that the facility is completed as intended;
 - changes to include items identified during construction that are required for the effective use and operation of the facility;
 - work that requires immediate attention resulting from accident, act of God, or other emergency conditions as provided for in the City's Standard Specifications or Special Provisions of the project; and
 - work requested by the City for which the contractor and the City cannot agree upon a price.

**Major Accomplishments Relating To
DPW's Administration Of Contract Change Orders**

In Appendix B, the DPW informs us of its major accomplishments in administering contract change orders. According to the Director of Public Works, the DPW is

- developing a Construction Records and Procedures Manual; and
- making the development of this manual the first priority of the Quality Management Section now that the Standard Specifications for Public Works Construction have been completed and adopted.

In addition, the DPW is

- refining and revising its procedures for negotiation guidelines and change order estimates; and
- ensuring that these revisions as applicable will be part of the Construction Records and Procedures Manual.

SCOPE AND METHODOLOGY

This is our second report on the Department of Public Works' (DPW) Capital Projects Management. Our objectives were to determine the following:

- whether the DPW's policies and procedures for the construction contract change order process are in effect; and
- whether the DPW's policies and procedures are adequate to ensure the effectiveness of pricing and negotiating change orders.

Our scope and methodologies included:

- analyzing the DPW's contract change orders the Office of the City Clerk processed from April 1, 1991, through July 9, 1992;
- testing the DPW's controls over contract change orders for 13 construction contracts during our audit of DPW's Cost Estimating Process;
- reviewing project files during our audit of Capital Projects Management - Unit-price and Time and Material contracts; and
- interviewing DPW personnel.

As part of our first audit of Capital Projects Management - Unit-price and Time and Material Contracts, we provided the DPW with a list of 180 threats. A "threat" is any unwanted event or occurrence. Of these threats, 33 specifically related to construction contract change orders. In conducting this first audit, we obtained from the DPW an understanding of their system of internal controls and how these controls work to prevent unwanted events

from occurring. We received the DPW's response to our list of threats on August 19, 1991.

For our second audit, we analyzed the DPW's responses to the change order threats. We then formulated questions based on the DPW's responses to these threats. We also prepared additional questions after conducting library research and telephone surveys of other organizations.

To expedite this audit, the City Auditor and the Director of Public Works met and agreed that their respective staffs would meet and identify those areas of concurrence regarding existing and proposed procedures for contract change orders. By so doing, the City Auditor's Office was able to limit its fieldwork to that performed during its audits of the DPW's Cost Estimating Process and Capital Projects Management - Unit-price and Time and Material Contracts.

We limited our review to City records. We did not review contractors' records, nor did we physically observe change order work.

FINDING I

THE DEPARTMENT OF PUBLIC WORKS CAN MORE EFFECTIVELY NEGOTIATE THE PRICE OF CONTRACT CHANGE ORDERS BY ENSURING ADHERENCE TO ITS EXISTING PROCEDURES AND IMPLEMENTING ADDITIONAL PROCEDURES

From April 1, 1991, through July 9, 1992, the Office of the City Clerk processed 404 Department of Public Works (DPW) contract change orders worth \$2,879,165. The DPW's Construction Estimating Procedures require that the Project Manager prepare a change order estimate for a:

- Determination of reasonableness of quotations submitted by the contractor; and
- Basis of negotiation with contractor to determine agreed prices for contemplated change.

In addition, the DPW's Construction Estimating Procedures specify a range of precision for contract change order estimates of +10 percent or -5 percent. However, our review revealed that DPW's Project Managers are not consistently preparing the required contract change order estimates. Further, we determined that DPW's Construction Estimating Procedures do not include several elements that could improve the DPW's ability to negotiate the price of contract change orders to the benefit of the City. By ensuring adherence to its existing procedures and adopting additional procedures, the DPW will improve compliance with its cost estimating procedures and improve its ability to negotiate the price of contract change orders.

**From April 1, 1991 Through July 9, 1992
The Office Of The City Clerk Processed \$2,879,165
In DPW Contract Change Orders**

The Office of the City Clerk provides administrative support for contracts. From the period of April 1, 1991, through July 9, 1992, the Office of the City Clerk processed 404 change orders. Our analysis of these 404 change orders is summarized in Table I.

TABLE I

**CHANGE ORDERS PROCESSED
FROM APRIL 1, 1991 THROUGH JULY 9, 1992**

<u>Dollar Range Of Change Orders</u>	<u>Number Of Change Orders</u>	<u>Percentage Of Total Change Orders</u>	<u>Dollar Value Of Change Orders</u>
\$20,000 and over	28	7%	\$1,744,168
\$10,000 to \$19,999	48	12%	688,020
\$5,000 to \$9,999	64	16%	457,223
\$0 to \$4,999	234	58%	463,922
Credit Change Orders	<u>30</u>	<u>7%</u>	<u>(474,168)</u>
Totals	<u>404</u>	<u>100%</u>	<u>\$2,879,165</u>

Of the 30 credit change orders shown above, 22 were less than \$10,000. Thus, 320 (79 percent) of the change orders processed from April 1, 1991, through July 9, 1992, were for less than \$10,000.

DPW's Construction Estimating Procedures

Requirements

The DPW issued a revised construction estimating procedure effective March 29, 1991. This procedure required each DPW Division to prepare construction estimates. DPW requires the preparation of five types of estimates, including change order estimates.

- Program Estimate
- Budget Estimate
- Preliminary Estimate
- "Engineer's" Estimate
- Change Order Estimate

According to the DPW the change order estimate is used for a

- Determination of reasonableness of quotations submitted by the contractor; and
- Basis of negotiation with contractor to determine agreed prices for contemplated change.

Given the reasons for preparing contract change orders, it follows that when a change order estimate is not prepared, the DPW is less able to determine (1) the reasonableness of the contractor's quotation or (2) a basis for negotiating prices.

The DPW procedure states that the change order estimate would be based on the following:

- A detailed proposal to a contractor for a change in the contemplated work of the construction contract;
- Costs developed by using unit prices, extension of bid/pay quantities, manufacturers' data, estimating handbooks, etc.; and
- Costs included for overhead, profit, general mark-up, and other items as described in the project specification.

Range Of Precision

The DPW states in its Construction Estimating Procedure that the difference between the five different types of estimates is in the precision of the estimate. Such precision is largely a function of the level of detail in the scope of work upon which the estimate is based. Generally, the ranges of accuracy for the different types of estimates are as follows:

<u>TYPE OF ESTIMATE</u>	<u>PERCENTAGE RANGE OF PROBABLE COST</u>
Program Estimate	+50 or -30
Budget Estimate	+30 or -15
Preliminary Estimate	+20 or -10
"Engineer's" Estimate	+15 or -5
Change Order Estimate	+10 or -5

The precision and reliability of the estimate depends on recent experience with similar projects, the complexity of the project, the type of construction (new, remodeling, or reconstruction), the age of existing facilities, and the level of refinement of the scope for the project and/or the

project construction documents. To a large extent, the better the available information the better the resultant estimate will be.

Preparation, Review, And Approval Of Change Order Estimates

The DPW's procedures require preparation, review and approval for each change order estimate. The Project Manager prepares the change order estimate. The Section Manager reviews change order estimates less than \$10,000 and the Division Manager approves them. The Section and Division Managers review change order estimates over \$10,000 and the Director approves these estimates.

Noncompliance With Procedures

Our audit revealed that DPW personnel were not consistently completing change order estimates as required.

During our audit of DPW's Cost Estimating Process, we reviewed 56 change orders. Of these 56 change orders, four were for time extensions only and did not require estimates. Of the 52 change orders requiring estimates, 18 (35 percent) had no estimate in the project file. The amount of these 18 change orders was approximately \$117,000.

Furthermore, 19 of the aforementioned 52 change orders requiring estimates were lump sum proposals from the contractors. The amount of these change orders was \$82,250. When the DPW does not prepare itemized change order estimates and accepts lump sum proposals from contractors that are not itemized, there is a risk that the contractor has improperly inflated the change order price proposal.

The DPW administrative personnel said the reason estimates for change orders were not consistently prepared was that DPW's change order procedures were new. The DPW has initiated training and other activities to ensure compliance in the future.

Additional Procedures DPW Does Not Currently Require

Ralph C. Nash, Jr., Professor of Law at George Washington University's National Law Center, says the following in his book entitled Government Contract Changes:

There has been concern from time to time on the part of some Government officials that a contractor can use the Changes clause as a vehicle for "getting well" under a contract where it is incurring a loss because of a substantial underbid or some other reason. There is no question that the clause has been and can be used for this purpose. Equitable adjustments for changes are negotiated in a noncompetitive environment and the contractor frequently is in a strong bargaining position in such negotiations. However, the Government has several ways to protect itself in this situation. Cost and pricing data can be, and generally are, required from the contractor, and the Contracting Officer can insist that no equitable adjustment will be processed until the contractor submits adequate proof of the claimed increased costs.

In addition, Mr. Nash states the following about negotiation techniques:

It has often been said that negotiation is an art rather than a science. However, there are certain principles that apply to almost all negotiation situations. The first is that good negotiation depends on good information. The party that can support its position with concrete data is, by far, in the stronger negotiating position and will generally prevail. In the case of estimating costs to be incurred in the future, this principle applies to pricing theories as well as factual data. The successful negotiator will have well-thought-out logic to support his or her pricing theory and will present data showing that the theory was an accurate predictor of costs in past cases. This combination of concrete

factual data and sound pricing logic is the essential ingredient of a strong negotiating position.

A second principle is that there is greater strength in an affirmative position than in a negative one. In the case of contractor proposals to increase the contract price, this principle applies in the first instance to the Government. The Government is in a stronger position if the Contracting Officer presents an affirmative statement of the amount he or she thinks is an accurate estimate of the cost of the adjustment rather than merely attempts to find flaws in the contractor's proposal.

Andrew M. Civitello, Jr., in his book entitled *Contractor's Guide To Change Orders--The Art of Finding, Pricing, and Getting Paid for Contract Changes and the Damages They Cause*, says that before contractor change order proposals can be designed and constructed, an understanding of their components must be developed. These basic elements--the three cost categories of every change that will sum up to the maximum amount of compensation justified--are:

- Direct costs;
- Indirect costs; and
- Consequential costs (damages).

Direct Costs

Direct costs are usually thought of as the "hard" costs of a change order. They include those items that are specifically and uniquely attributable to the modified work. All direct costs share the common characteristic of being clearly assignable to an event and can easily be documented. By their nature, they also facilitate accurate accounting. Because of their clear cause and effect relationships, they are readily justifiable as change order cost items. They include such things as:

- Labor;
- Material;
- Equipment;
- Site supervision;
- Off-site material carrying costs;
- Shipping costs;
- Restocking charges;
- Additional performance and payment bond premiums; and
- Temporary heat, light, and power.

Indirect Costs

Indirect costs--the soft costs--are those items that, although precipitated specifically by the change order, are less obviously justifiable as change order costs. They may be more difficult to recognize. If so recognized, indirect costs are harder to apportion to a specific event and thus are more difficult to count. Indirect costs include such items as:

- Home office overhead;
- Off-site supervision;
- Change order preparation, research, negotiation, and associated travel;
- The effects of project interference and disruption;
- Time delays;

- Opportunity costs; and
- Lost profit.

Consequential Costs (Damages)

Consequential costs to the contractor are the most difficult of all the change order cost components to secure owner recognition as a legitimate item. The kinds of things that fall into the consequential cost category are most often thought of as damages--the stuff that lawsuits are made of--and include:

- Strikes;
- Interference and disruption;
- Project delay costs;
- Approval delays that alter the originally anticipated sequences or conditions;
- Delay in retainage release (carrying costs);
- Delay in project close out (keeping capacity tied up--opportunity costs);
- Delay in contract work (cash flow interruption and opportunity costs);
- Canceled contracts;
- Lost profit; and
- Acceleration.

The assembling of the three change order component prices can be divided into two categories: internal and external. The internal company charges are again split among the direct, indirect, and consequential costs. External costs are from subcontractors and suppliers.

Benefits Of Ensuring Compliance With Existing Procedures And Adopting New Procedures

The DPW agreed that a pricing methodology similar to the one shown above is applicable for lump sum contractor proposals and DPW change order estimates. Accordingly, contractors should submit change order prices on lump sum proposals in sufficient breakdowns and at such level of detail as the City may determine to allow efficient checking. This would provide the City with a better basis for evaluating contractor change order proposals.

In our opinion, the implementation of a methodology similar to that described above would benefit the City in the following ways:

- make the change order process systematic and applied consistently to the same extent in each change situation;
- transmit the message that this component cost treatment is a standard procedure;
- ensure that everyone in the DPW considers the costs of changes; and
- help to educate all employees to consider all parts of an added expense.

CONCLUSION

Our review revealed that DPW's Project Managers are not consistently preparing the required contract change order estimates. When a change order estimate is not done, the DPW is less able to determine the reasonableness of the contractor's quotation or determine a basis for negotiating prices. Further, the DPW's Construction Estimating Procedure does not include several elements that could improve DPW's ability to negotiate the price of contract change orders to the benefit of the City. By ensuring adherence to its existing procedures and adopting additional procedures, the DPW will improve compliance with its cost estimating procedures and improve its ability to negotiate the price of contract change orders.

RECOMMENDATIONS

We recommend that the Department of Public Works:

Recommendation #1:

Develop, implement, and monitor additional control procedures to ensure that estimates are prepared for all applicable change orders. (Priority 3)

Recommendation #2:

Ensure that a change order is written for all changes that have a time and/or cost impact. (Priority 3)

Recommendation #3:

Establish standards for cost breakdowns required when the DPW prepares change order estimates. (Priority 3)

Recommendation #4:

Establish standards for cost breakdowns and require contractors and subcontractors to adhere to these standards when submitting proposed changes. (Priority 3)

Recommendation #5:

Develop a standard form which includes a breakdown of the claimed costs and require its use for all change order items over an established dollar amount. The form should include a breakdown that covers the following types of cost components:

- contractor-performed work;
- material costs for contractor-performed work;
- equipment costs for contractor-performed work; and
- subcontractor-performed work.

(Priority 3)

Recommendation #6:

Review change proposals for scope of work, appropriateness of items claimed, pricing, compliance with contract provisions, and accuracy of computations. (Priority 3)

Recommendation #7:

Reconcile the contractor's change proposal with the change order estimate prior to initiating negotiations with the contractor. (Priority 3)

Click On The Appropriate Box To View Item

